WHAT IS CLAIMED

1. A optical element comprising:

a. two control inputs,

b. an optical processing arrangement for producing an optical output that corresponds to a logical NOR function of the two control inputs.

2. The optical element of claim 1 in which the control inputs are optical inputs.

3. The optical element of claim 1 in which the control inputs are electrical inputs.

4. The optical element of claim 1 in which a single light source is used in conjunction with the two control inputs to produce said optical output.

5. The optical element of claim 1 in which the optical processing arrangement comprises at least one combination of optical elements producing respective XOR and COIN function outputs of the two control inputs which function outputs are used in producing a logical NOR function of the two control inputs.

6. The optical element of claim 5 in which the at least one combination of optical elements comprises at least one spatial light modulator.

7. The optical element of claim 6 in which the at least one combination of optical elements comprises at least one beam splitter.

8. The optical element of claim 5 in which the at least one combination of optical elements comprises at least one phase modulator.

9. The optical element of claim 8 in which the at least one combination of optical elements comprises at least one beam splitter.

10. The optical element of claim 5 in which the at least one combination of optical elements producing respective XOR and COIN function outputs of the two control inputs comprises two beam splitters with one producing an XOR function output and one producing a COIN function output.

11. The optical element of claim 5 further comprising an optical arrangement comprising at least one beam splitter for combining the XOR function output with the COIN function output to produce an optical output that corresponds to a logical NOR function of the two control inputs.

12. The optical element of claim 11 in which the XOR function output and the COIN function output are combined with a phase shifted version of the same light source used to produce the XOR and COIN function outputs to produce a logical NOR function of the two control inputs.

13. The optical element of claim 11 in which the optical arrangement comprising at least one beam splitter also produces a logical AND function of the two control inputs.

14. An information processing system comprising a plurality of optical elements, at least one of which comprises an optical NOR gate.

15. The information processing system of claim 14 in which the plurality of optical elements comprises an optical processor.

16. The information processing system of claim 14 in which the optical processor comprises an optical NOR gate.

17. An communication system comprising a plurality of optical elements, at least one of which comprises an optical NOR gate.